Shielded Bags

The TBSB line of shielded bags is designed to suppress interference from ambient noise when carrying out EMC pre-compliance measurements. The shielded bags are a low cost alternative to shielded tents for test equipment such as LISNs or TEM-cells.
The shielded bags are composed of two layers of conductive fabrics. The access opening is sealed with conductive Velcro tape. Suggestions on how to feed cables into the bags are given in the application section of this manual.

Picture 1: TBSB-105/60, top and TBSB-70/40 botton compared to Tekbox TEM-cells TBTC2 and TBTC1

1 Specification

Outer dimensions:	TBSB-105/60: 105 cm x 60 cm TBSB-70/40: 70 cm x 40 cm
Opening dimensions:	TBSB-105/60: diagonal 80 cm TBSB-70/40: diagonal 60 cm
Frame:	none
Shielding:	2 layers of conductive fabrics
Seal:	conductive Velcro tape
Filter panel:	none
Attenuation:	~ 50 dB in the range DC to 2 GHz
Weight:	TBSB-105/60: 250 g TBSB-70/40: 140 g

2 Application

Picture 2: TBSB-70/40 and a TBTC1

Picture 3: TBSB-70/40; inserting a TBTC1

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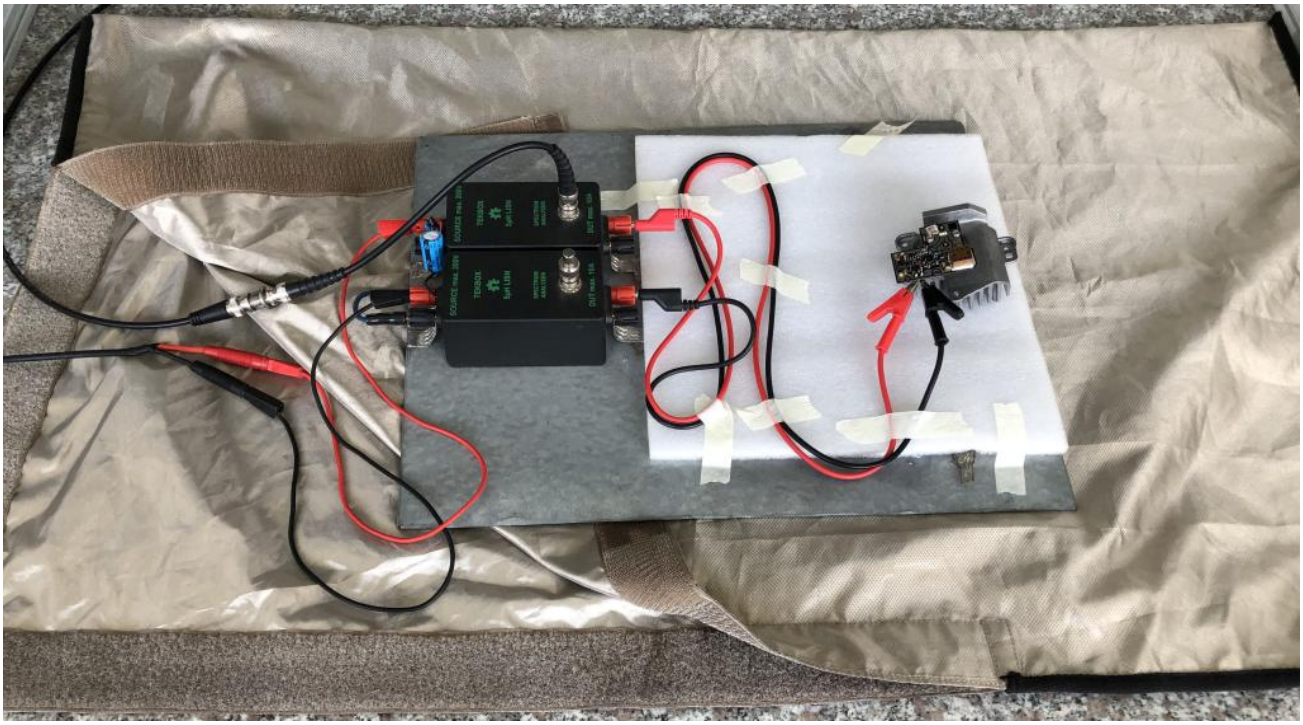
Picture 4: TBSB-70/40 with TBTC1 inside, closed



Picture 5: TBSB-105/60, preparing conducted noise measurement set up

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Picture 6: TBSB-105/60, preparing conducted noise measurement set up

Picture 7: TBSB-105/60, preparing conducted noise measurement set up

Picture 8: TBSB-105/60, conducted noise measurement set up inside

Conducted and radiated noise pre-compliance measurement set-ups typically suffer from ambient noise picked up by open TEM-cells, antennas, supply lines connected to LISNs or cables fed through RF current monitoring probes. Though upfront measurements with unpowered DUTs give a good overview on the ambient noise spectrum, working with a shielded set up offers significantly more comfort.
If a laboratory does not offer sufficient space for a permanently set up shielded tent, shielded bags will be a useful and affordable alternative.
Applying suitable methods to feed cables into the bags, shielding performance similar to a shielded tent will be achieved.
Open TEM-cells can be inserted directly into the bags. The structure of the TEM cell will prevent the DUT getting into contact with the conductive fabrics. Other set ups can be protected with a cardboard box, as an example.

3 Warning

Make sure that your set up prevents main phase getting into contact with the fabrics of the tent. Always connect protective earth to avoid any hazard of electrical shock.

4 Cable feed through

In any application it is necessary to feed at least a coaxial cable and supply cables for the DUT into the shielded bag.

Coaxial cables:

In order to feed a coaxial cable into the shielded bag, an electrical contact between the conductive Velcro tape and the cable shield needs to be established. There are two simple options. Either strip the insulating outer jacket of the coaxial cable or use two cables, connected through a coaxial adapter. When using the TEM-cell inside the shielded bag, the DC-block can be used to establish contact with the Velcro tape. Clamps can be used to avoid gaps and to secure the cable.

The type of coaxial cable has great influence on the overall performance of a shielded set up. Using RG58 cables is not recommended, due to poor shielding of the outer mesh. Use at least a RG223 cable or a double shielded coaxial cable.

Picture 9: feed through using coaxial adapter

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Picture 10: feed through using coaxial adapter; bag closed

Picture 11: feed through using coaxial cable with stripped jacket

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Picture 12: feed through using coaxial cable with stripped jacket; bag closed

Picture 13: feed through at the DC-block of a TEM-cell; bag closed

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Power supply cables:

Power supply feed through should be implemented using shielded cables, with the shield on ground and the jacket stripped, where the cable passes the conductive Velcro tape. At the power supply side, connect power supply ground with housing earth, to reduce the risk of picking up ambient noise from within the power supply housing and channel it into the shielded bag.
Depending on the properties of the power supply, a shielded cable may not be enough. Insert a filter, if you encounter excessive ambient noise inside the bag, despite using a shielded supply cable. A simple pi-filter in a shielded housing should do the job. If you own a DC-LISN which is not part of the set up inside the bag, you can use it as supply line filter.

Picture 14: DUT supply feed through using a shielded cable with stripped jacket

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Picture 15: DUT supply feed through using a shielded cable with stripped jacket; bag closed

Picture 16: DUT supply at power supply side; connect power supply ground with housing earth

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Picture 17: DUT supply feed through using a shielded cable and a 5µH LISN as supply line filter

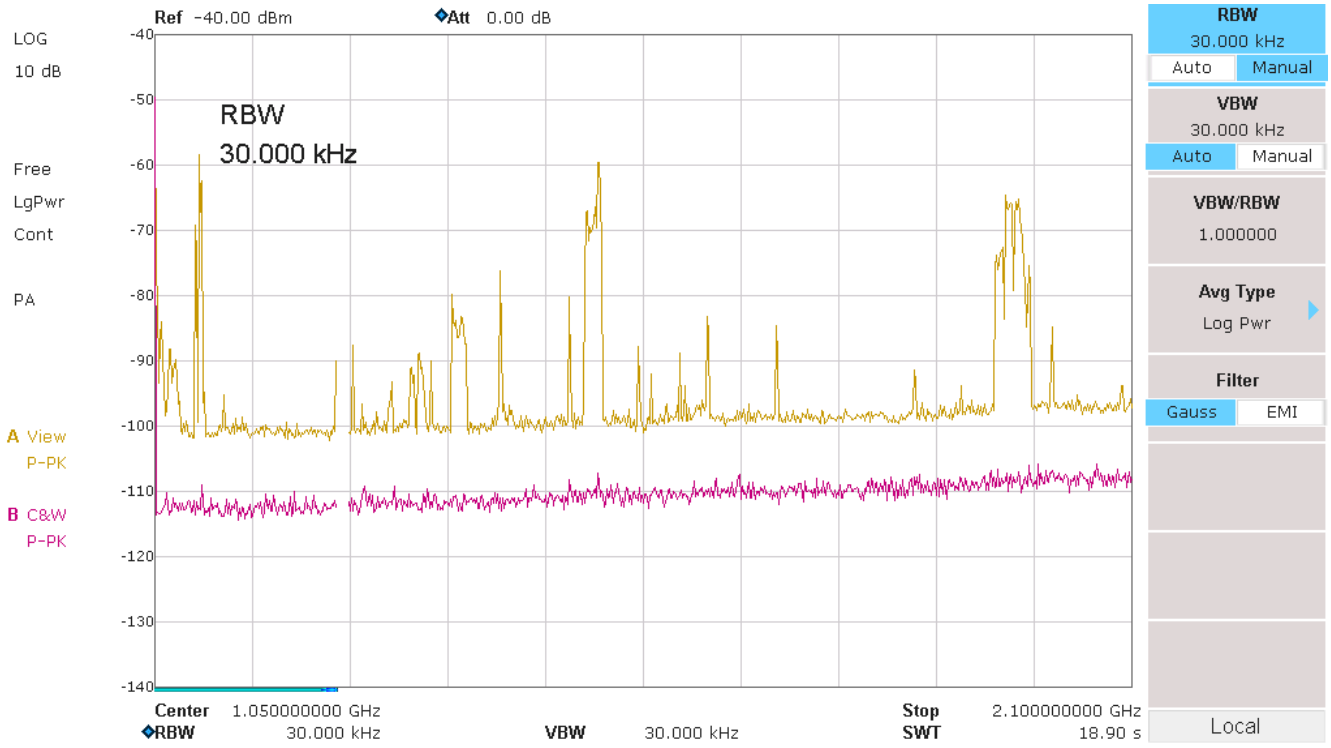
Picture 18: using banana to BNC adapters and a BNC cable as shielded supply line

Signal cables:
Use shielded cables and remove the insulating jacket where you feed it through the Velcro tape. Many signal cables such as for example USB or HDMI are shielded by default. All that is necessary is removing the outer jacket.

5 Sample Plots

5.1 Example: Radiated noise pre-compliance set up using a TBTC1 TEM-cell

The ambient noise spectrum plots below were taken with a TBTC1 TEM-cell outside and inside of the shielded bag. No DUT was placed inside. The plot shows the ambient noise picked up by the septum.



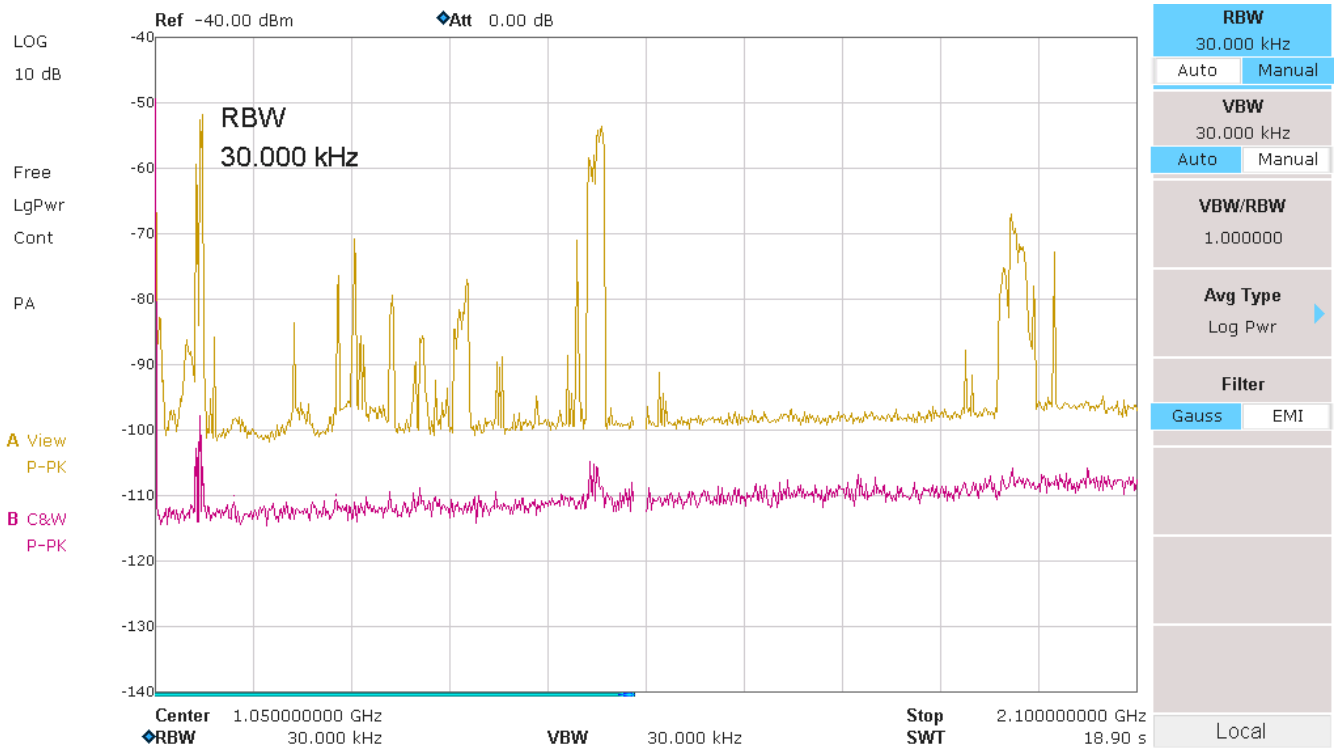
Picture 19: ambient noise picked up by the TBTC1 TEM-cell (set up according to picture 2)

The yellow curve in Picture 19 above shows the ambient noise picked up by the TEM cell when placed outside the shielded bag. RBW: 1 MHz, Attenuator = 0 dB, Pre-amplifier = ON

The pink curve in Picture 19 above shows the ambient noise picked up by the TEM cell when placed inside the shielded bag. The RBW was reduced to 30 kHz to reduce the base noise floor in order to better show the difference.

5.2 Example: conducted noise pre-compliance set up

The ambient noise spectrum plots below were taken with a conducted noise pre-compliance test set up outside and inside of the shielded bag. The DUT was not powered.



Picture 20: ambient noise picked up by the conducted noise test set up (set up according to picture 5)

The yellow curve in Picture 20 above shows the ambient noise picked up by the conducted noise set up when placed outside the shielded bag. RBW: 1 MHz, Attenuator = 0 dB, Pre-amplifier = ON

The pink curve in Picture 19 above shows the ambient noise picked up by the conducted noise set up when placed inside the shielded bag. The RBW was reduced to 30 kHz to reduce the base noise floor in order to better show the difference.

6 History

Version	Date	Author	Changes
V 1.0	29.1.2019	Mayerhofer	Creation of the document
V 1.1	16.4.2019	Mayerhofer	Dimensions updated, chapter 5 updated
V 1.2	30.7.2025	Tauchner	Dimension update, chapter 7 updated

7 Ordering Information

Part Number	Description
TBSB-105/60	Shielded bag 105 cm x 60 cm, RF cable RG223/N-male to N-male/75 cm, repair patch fabrics
TBSB-70/40	Shielded bag 70 cm x 40 cm, RF cable RG223/N-male to N-male/75 cm, repair patch fabrics